Appendix B

Certified Validation Report Template, Part A: Provided by Validator

Audit Information:

Water Supplier Name: Desert Water Agency PWS ID: 3310005

System Type: Potable Audit Period: Calendar Year 2018

Utility Representation: Heather Marcks senior engineering technician

Validation Date: 9/26/2019

Validation Findings & Confirmation Statement: ...

Key Audit Metrics:

Data Validity Score: 61 Band (Level): Band III (51-70)

ILI: 4.12 Real Loss: 78.70 (gal/conn/day) Apparent Loss: 16.30 (gal/conn/day)

Non-revenue water as percent of cost of operating system: 3.8%

Certification Statement by Validator:

This water loss audit report has been Level 1 validated per the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34.

All recommendations on volume derivation and Data Validity Grades were incorporated into the water audit.

If not, rejected recommendations are included here.

...

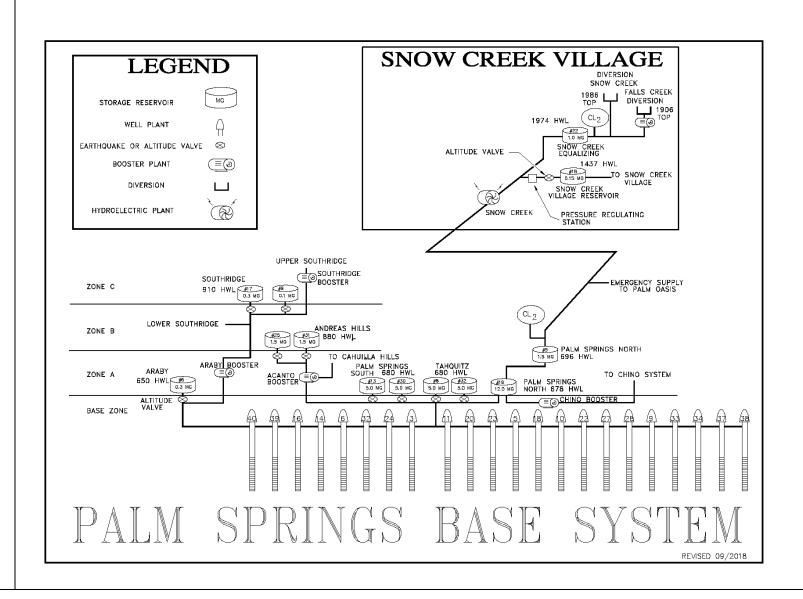
Validator Information:

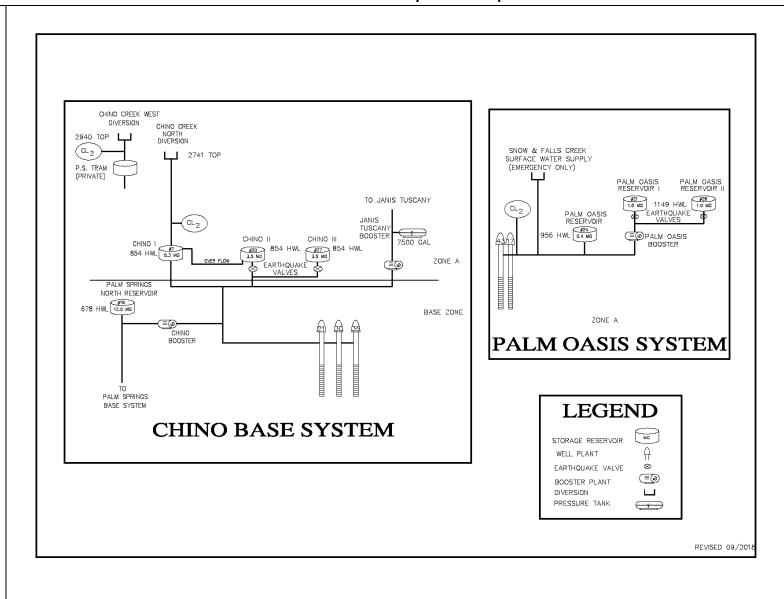
Water Audit Validator: Sarah Rapolla Qualifications: Water Audit Validator Certificate issued by the CA-NV Section of the AWWA

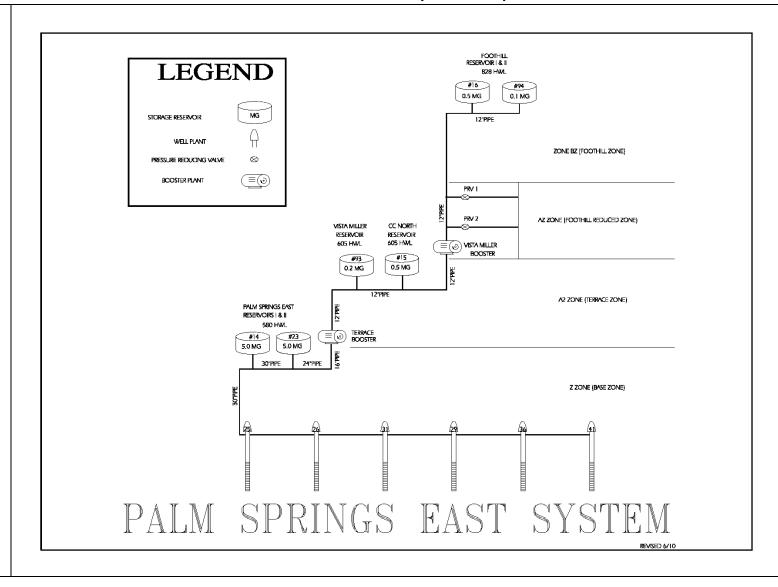
APPENDIX A: Level 1 Validation Notes Template

Pre-Interview Notes

Supplier has provided a system schematic(s) and all required supporting documentation for the report. There have been no new major facility additions to the system since last year's audit. Updated information for the meter replacements was requested from and provided by the Supplier. Clarification was also requested with regard to data provided for the Total Annual Cost of Operating Water System. Said clarification was provided as requested.







Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Volume from	Supply meter profile: The Desert Water Agency (DWA) has 33 groundwater wells of which 23 were active during the reported calendar year. Daily manual reads are performed at each site. DWA also has two surface water sources in the form of	Percent of VOS metered: 100%
Own Sources		Signal calibration frequency: None
(VOS)	stream flows entering the system. The source stream measurements are estimated on a monthly basis using weir flow rates.	Volumetric testing frequency: 100% of active meters tested in previous calendar year; none tested in reported calendar year
		Volumetric testing method: Energy efficiency with pitot tube
		Percent of VOS tested and/or calibrated: 96% (all active meters)
	VOS Input Data Source: Manual reads of production meters which are entered into the WellPro database. Comments: Confirmed input derivation from the supporting documents provided for well and stream reads. Confirmed the exclusion of any/all non-potable volumes of source water. Energy efficiency tests (i.e. accuracy tests) were conducted on all active wells during the 2017 calendar year. These are the same wells that were active during the current audit year (i.e. calendar year 2018). There were no accuracy tests performed on any wells during the current audit year.	Comments: 96% of VOS in reported calendar year was accuracy tested the previous calendar year (i.e. C.Y. 2017). There were no electronic calibration tests performed on any of the meters. A grade of 5 was assigned due to the fact that greater than 25% (30.4%) of tested meters were found to be outside the +/- 6% accuracy range. Confirmed DVG: 5
	Confirmed input value: 33,141.858 acre-feet/yr	
VOS Master	Adjustment Basis: Energy efficiency tests (i.e. accuracy tests) were performed on all 23 active meters during the previous calendar year (i.e. C.Y. 2017)(96% of total VOS). The results of all said tests were provided with supporting documents.	Supply meter read frequency: Daily.
Meter Error		Supply meter read method: Manual.
Adjustment		Frequency of data review: Monthly.
	Net Storage Change Included: No.	Storage level monitoring frequency: Yes (in real-time via SCADA).
	Comments: Accuracy test results from C.Y. 2017 were shown alongside DWA meter reads for all active meters. Change in production due to variance/meter inaccuracy was also included and an overall meter inaccuracy extrapolated from the data. The input value for the reported calendar year was lower than what was reported the previous calendar year. This was due to the variance in production for each individual well site and accompanying changes in production from variance. Confirmed total DWA meter accuracy from data provided.	Comments: A grade of 3 was confirmed due to no automatic (telemetry) data logging for the well meters. Storage levels for the reservoirs are reported in real-time via telemetry. However, changes in storage levels are not used in the MMSEA input.

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
	Confirmed input value: -0.34%	Confirmed DVG: 3
Water	Import meter profile: n/a	Percent of WI metered: n/a
Imported (WI)		Signal calibration frequency: n/a
(**1)		Volumetric testing frequency: n/a
	WI Data Source: n/a	Volumetric testing method: n/a
		Percent of WI tested and/or calibrated: n/a
	Comments: n/a	Comments: n/a
	Confirmed input value: n/a	Confirmed DVG: n/a
WI Master	Adjustment Basis: n/a	Import meter read frequency: n/a
Meter Error Adjustment		Import meter read method: n/a
Aujustinent	Comments: n/a	Frequency of data review: n/a
		Comments: n/a
	Confirmed input value: n/a	Confirmed DVG: n/a
Water	Export meter profile: n/a	Percent of WE metered: n/a
Exported (WE)		Signal calibration frequency: n/a
(VV E)		Volumetric testing frequency: n/a
	WE Data Source: n/a	Volumetric testing method: n/a
		Percent of WE tested and/or calibrated: n/a
	Comments: n/a	Comments: n/a

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
	Confirmed input value: n/a	Confirmed DVG: n/a
WE Master Meter Error Adjustment	Adjustment Basis: n/a	Export meter read frequency: n/a Export meter read method: n/a Export meter read method: n/a
	Comments: n/a	Frequency of data review: n/a Comments: n/a
	Confirmed input value: n/a	Confirmed DVG: n/a
Billed Metered Authorized Consumption (BMAC)	Customer Meters & Reads Profile: - Age profile: Average age of meters is not known. However, meters are changed out on a 20 year cycle. There were approximately 1,000 meters changed out during the reported calendar year with conversion to AMR. - Reading system: For the reported calendar year, the reading system was a mixture of manual read (25%) and AMR (75%) meters. - Read frequency: Monthly. Billing Data Pro-rated? No. Comments: Exclusion of any/all non-potable consumption volumes was confirmed based on data provided. There was no lag-time correction(s) applied to the input derivation.	Percent of customers metered: 100% Small meter testing policy: Existing testing is limited and mainly based on customer complaints and/or accounts that have been flagged for high consumption. All new meters are tested via test bench for accuracy (based on manufacturer's specifications) prior to installation in the field. Number of small meters testing/year: Approximately 6 per year. Large meter testing policy: Reactive testing based on customer complaints and/or accounts that have been flagged due to high consumption. Number of large meter tested/year: No large meters tested during the reported calendar year. Meter replacement policy: Ongoing meter replacement policy based on a 20 year cycle at a rate of approximately 7% each year with conversion from manual read to AMR.

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
		Number of replacements/year: Historically, approximately 1,700 meters are replaced annually mainly due to old age. In the reported calendar year, approximately 1,000 meters were replaced with conversion to AMR.
		Billing data auditing practice: Standard billing QC with volume review by use type (by zone) for each billing cycle. Zones have been updated for the reported calendar year. Select accounts are audited annually by the financial auditor.
		Comments: 100% of customers are metered. Meter replacement program is in place (20 year cycle), but existing meters are only tested on a reactive basis. All new AMR meters are accuracy tested via test bench prior to installation in the field. Supplier is in the process of developing an updated meter testing program. Grade of 7 is confirmed based 100% of customers being metered, good record keeping, testing of all new AMR meters, and annually auditing by third party auditor. However, only limited meter accuracy testing is conducted on existing meters.
	Confirmed input value: 30,042.202 acre-ft/yr	Confirmed DVG: 7
Billed Unmetered	Billed Unmetered Profile: n/a	Policy for metering exemptions: n/a
Authorized Consumption (BUAC)	Input Derivation: n/a	Comments: n/a
, ,	Comments: n/a	
	Confirmed input value: n/a	Confirmed DVG: n/a

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Unbilled Metered Authorized	Unbilled Metered Profile: UMAC consists of DWA facility use and private fire services (via detector check) only.	Policy for billing exemptions: Billing exemptions are limited to DWA facilities only.
Consumption (UMAC)	Input Derivation: Based on regular meter readings.	Comments: Grade of 3 based on the absence of any dated written procedures for billing exemption.
	Comments: Confirmed input derivation from supporting documents provided.	
	Confirmed input value: 437.579 acre-ft/yr	Confirmed DVG: 3
Unbilled Unmetered	Unbilled Unmetered Profile: UUAC consists of water used for operational flushing and fire-fighting water used by fire departments.	Default or Adjusted Default Applied: No.
Authorized Consumption (UUAC)	Input Derivation if Estimated: Flushing reports are provided by the construction department for each event and include information such as location, pressure, outlet size, and duration of flush. Engineering technicians use information from said forms along with Greely's formula of water through an orifice to calculate the volume of water used per flushing event. The fire department provides the same forms and	Completeness of Documentation: Total volumes for flushing and fire-fighting were provided (listed per event with monthly totals). Individual flushing reports were also made available to help verify completeness of the data.
	information for every fire-fighting event. Engineering technicians use the same formula to calculate water use in these cases.	Comments: Grade of 10 confirmed based on the existence of clear policies identifying permitted use of unbilled, unmetered water. Detailed, complete records exist for each occurrence and a known formula is utilized to calculate water volumes based on
	Comments: Input derivation from supporting documents was confirmed. It should be noted the fire department is now utilizing the same forms and information to submit water use for fire-fighting incidents. This provides consistency in water use calculations.	information provided for each occurrence.
	Confirmed input value: 57.393 acre-ft/yr	Confirmed DVG: 10
Unauthorized Consumption (UC)	Default Applied? Yes.	Instances and extent of UC documented: None.

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
	Input Derivation if Customized: n/a – Default input applied.	Comments: Default grade applied.
	Comments: Default input applied.	
	Confirmed input value: 83.134 acre-ft/yr	Confirmed DVG: 5
Customer Metering Inaccuracies (CMI)	Input Derivation: See BMAC regarding meter testing activities and meter replacement programs. Input derivation is estimated based on reference data (i.e. manufacturer's specs). 1% error adjustment is based on manufacturer's listed error and the fact that all new meters are tested to verify they fall within the manufacturer's acceptable range prior to installation in the field. Approximately 1,000 meters (or approximately 5% of inventory) tested prior to installation in the system.	Characterization of meter testing: Routine testing of all new meters is performed prior to installation in the field. Meter testing on existing (older) meters is reactive (i.e. based on customer complaints and/or flagged accounts due to high consumption).
	Comments: There were no test results provided. The process for testing new meters prior to installation was described by the Supplier in detail.	Characterization of meter replacement: Annual meter replacement based on 20 year cycle. The oldest meters are replaced at an average rate (historically) of approximately 1,700 meters per year. There were approximately 1,000 meters replaced and converted to AMR during the reported calendar year.
		Comments: Grade of 5 was recommended (originally input as a 4) based on good recordkeeping, internal bench testing on a limited number of meters (more than just customer complaints; approximately 5% of inventory tested based on all new AMR meters being internally bench tested prior to installation in the field). There were approximately 1,000 meters replaced (with all new meters being accuracy tested) and converted to AMR. Data is improving due to the increasing percentage of AMR meters in the system (75% AMR to 25% manual read in the reported calendar year).
	Confirmed input value: 307.877 acre-ft/yr	
		Confirmed DVG: 5

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment	
Systematic Data Handling Errors (SDHE)	Input Derivation: n/a – default input applied.	If custom estimate provided Characterization of read collection & billing process: n/a	
Ellois (SDIIE)	Comments: Default input applied.	Characterization of billing process and billing data auditing: n/a	
	Confirmed input value: 75.106 acre-ft/yr	Confirmed DVG: 5	
Length of Mains	Input Derivation: Data is taken from the Pipes database which is updated on a regular basis.	Mapping format: Paper. Maps are updated via autoCAD.	
	Hydrant lateral length included: Yes.	Asset management database: Database does exist and is updated on a regular basis. However, said database exists separately from a GIS system.	
	Comments: Fire hydrant and fire service lateral lengths have been included in the total length of mains. Said lengths were calculated using the total number of hydrants and fire services multiplied by the average length of run which is estimated to be 30 feet.	Map updates & field validation: Updates to system maps and field validation of pipe lengths occur during processing of project work orders. Said data is updated as each project is completed.	
	Confirmed involved 422.0 miles	Comments: Grade of 7 was based on the Supplier having a sound, written policy in place for new main installation. Data is updated on a regular basis in electronic format and accurate paper maps are utilized. Updates to data occur as projects are completed. The existing database is separate from a GIS system at this time. Steps are being taken to implement a GIS system in the near future.	
	Confirmed input value: 423.9 miles	Confirmed DVG: 7	
Number of Active and	Input Derivation: Data is taken from the billing system and the annual Op/Stat report.	CIS updates & field validation: Updates are achieved through routine meter reading procedures. Field verification is usually	
Inactive	Basis for database query: Meter and account identification by the IT department.	limited to requested site visits. It should be noted that additional field verifications were performed in the reported calendar year in	

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Service Connections	Comments: The annual Op/Stat report takes into account all active and inactive domestic water services. Verified that any/all reclaimed services, fire services, private wells, and/or temporary construction maters were excluded from total count.	an effort to identify services that had been abandoned but were still being counted.
		Estimated error of total count within: between 2 and 3%
		Comments: Grade of 7 based on a computerized management system being in place. Well written procedures and policies existing for new account activation and billing. Field verification is limited. However, additional field verification was performed in reported calendar year. Error in total number of service connections is believed to be between 2 and 3%.
	Confirmed input value: 25,527	
		Confirmed DVG: 7
Average	Are customer meters at the curbstop? Yes.	Comments: Default grade of 10 applied.
Length of Customer	Where are customer meters installed if not at curbstop? At property line.	
Service Line	Customer service line derivation: Default input applied.	
	Comments: Customer meters are typically installed at curb stop or property line.	
	Default input value of 0 applied.	Confirmed DVG: 10
	Confirmed input value: 0.	
Average Operating Pressure	Number of zones, general setup: Wide valley floor with varying ground elevations and 13 different pressure zones. There were 2 additional zones added to the system during the reported calendar year due to a new housing project that required additional facilities (i.e. reservoirs, boosters, etc.).	Extent of static pressure data collection: Pressure data is collected with gauges in response to low pressure complaints by customers and fire flow testing by the local fire departments.
	Typical pressure range: 40 to 140 psi.	Characterization of real-time pressure data collection: Real-time data monitoring is limited to booster stations and storage tank levels.
	Input derivation: Supplier used calculations and weighted averages for each zone based on the number of accounts and median pressure within each zone. From this	

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
	information, Supplier calculated the weighted average pressure within each zone as, subsequently, the total weighted average pressure for the system.	Hydraulic model in place? Calibrated?: A hydraulic model is in place and has been calibrated within the last 5 years.
	Comments: Pressure is mapped using storage tank elevations (water levels are electronically recorded in SCADA) and topographical data.	Comments: Grade of 5 was confirmed based on using calculations and weighted average for each zone to determine a weighted average pressure for the system. A hydraulic model is in place and updated within the last 5 years. Real-time source data (i.e.
	Confirmed input value: 79.7 psi	reservoirs and boosters) is brought in electronically via SCADA. Pressure verification via gauges for customer low pressure complaints and fire flow test data from the fire departments. System has color coded valves that act as effective pressure controls to separate the different zones. Very rarely are these valves found to be accidentally open.
		Confirmed DVG: 5
Total Operating Cost	Input Derivation: Data is taken from official financial reports.	Frequency of internal auditing: Annually. Frequency of third-party CPA auditing: Annually.
(TOC)	Comments: Confirmed that costs provided were limited to water system only	rrequerity of third-party of A additing. Annually.
	(including water debt service).	Comments: Grade of 10 confirmed based on reliable electronic accounting system in place which tracks all operating costs for water system. Annual auditing is performed by Agency personnel. Annual auditing is also performed by a third party CPA.
		Confirmed DVG: 10
	Confirmed input value: \$27,935,986 (\$/yr)	
Customer Retail Unit Cost	Input Derivation: Weighted average (\$/100 cu. ft.) based on percentage of total volume sold multiplied by unit rate for each rate type.	Characterization of calculation: All rate types are weighted based on % of total volume sold and a weighted composite average is calculated using these values.

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
(CRUC)	Sewer Charges Volumetric? Some sewer charges are based on water meter readings (i.e. consumption based).	Comments: Grade of 9 based on the calculations having not been reviewed by an M36 water loss expert. Recommend said review in order to increase grade for next year.
	Sewer Charges Included? No sewer charges were incorporated into the calculation for the reported calendar year.	
	Comments: There were not sewer charges incorporated into the calculation for the reported calendar year. Construction meter charges were incorporated.	
	Confirmed input value: \$1.83 (\$/100 cubic feet (ccf))	Confirmed DVG: 9
Variable Production Cost (VPC)	Supply profile: Own sources only. No imported or exported water. Direct variable costs included: Primary costs include internal source of supply, pumping expense (power), and treatment costs are included.	Characterization of calculation: Variable production cost is a weighted average composite of all rates/costs (i.e. source of supply, pumping expense, and treatment). No change from last year in terms of method.
	Secondary costs included: Wear and tear on equipment is incorporated into pumping expense. Comments: No additional comment.	Comments: Grade of 7 confirmed based on inclusion of primary costs in addition to some secondary costs. Reliable accounting system in place. All data is audited at least annually by Agency personnel. Data has not been audited by a third party agency knowledgeable in M36 methodology. Recommend taking this additional step to increase score for next year.
	Confirmed input value: \$255.62 (\$/acre-ft)	Confirmed DVG: 7

Audit Input Confirmation of Input Derivation Confirmation of DVG Assignment

Pending Items needed to complete the validation

All required documents have been provided and additional explanation given upon request. No further information is needed to complete the validation.

Key Audit Metrics

Data Validity Score: 61

Data Validity Band (Level): Band III (51-70)

Real Loss: 78.70 (gal/connection/day)

Annual Cost of Real Losses: \$575,222

Annual Cost of Apparent Losses: \$371,563

Infrastructure & Water Loss Management Practices:

Infrastructure age is approximately 40 years old based on weighted average of each age group of pipe within the system. The Supplier has increased the length of pipe being replaced due to age and/or leaks each year which will help improve the average age of pipe in the system. Agency personnel use the pipes database to prioritize mains based on a number of different categories (i.e. year installed, number of total and recent leaks, cost for repairs, etc.) in order to determine which mains to replace in a given year. Based on the pipes database, the total number of leaks detected and repaired for the reported calendar year (C.Y. 2018) was 1,046. This is an improvement over last year's audit number. The current method of proactive leakage management is leak detection and repair, pipeline replacement, and pressure management. The current meter replacement program consists of meters being replaced on a 20 year cycle.

Comments on Audit Metrics & Recommendations for Validity Improvements:

The infrastructure leakage index (ILI) of 4.12 suggests that this particular system experiences leakage at a rate that is 4.12 times the modeled technical minimum based on the characteristics of the system being audited. The ILI has improved since last year's audit – mainly due to improved identification of apparent losses vs. real losses.

The Data Validity Score fell within Band III (51-70) which suggests that future steps should be taken to focus on improving the reliability of the input data and exploring ways of improving/preventing water and revenue loss. It should be noted that the Supplier did improve the accuracy in some areas including unbilled unmetered water by utilizing formula as a standard for all types of usage in this category and maintaining detailed records. The grade for system pressure also improved due to a better method of calculating average system pressure that took into account the different zones and number of accounts in each zone. In addition, the Supplier is in the process of putting together a meter testing program which will improve the meter accuracy grades. They are also budgeting for implementation of a GIS program which will help increase accuracy of data, etc.

Suggestions for improving the overall data validity grade include:

- Implementation of the meter testing program which will expand the small and large, new and old meters tested on an annual basis.
- Introducing telemetry for well meters in order to enable future electronic calibration testing. If this is performed annually on all active well meters it would increase reliability.
- Implementation of the GIS program.

Audit Input	Confirmati	ion of Input Derivation	Confirmation of DVG Assignment
		- Continued annual testing of all active well meters. Active meters tests performed in the reported calendar year. By maintaining an	were tested in the 2017 calendar year. However, there were no annual testing program on these meters, reliability will increase.

Certified Validation Report Template, Part B: Provided by Utility

Water Supplier Name: Desert Water Agency

Water Supplier ID Number: 3310005

Water Audit Period: Calendar Year 2018

Water Audit & Water Loss Improvement Steps:

Utility provided steps taken in preceding year to increase data validity, reduce real loss and apparent loss as informed by the annual validated water audit:

- Billed metered data validity increased from 6 to 7 due to new meter testing meeting "limited testing by targeting a certain subset" criteria and all other criteria previously met.
- Unbilled unmetered data validity increased from 8 to 10 due to improving water use estimation techniques, record logging and record keeping along with participation from local fire department for detailed reporting.
- Number of active and inactive service connections data validity increased from 6 to 7 due to verifying that there is a computerized system recording new installation and abandonments and is believed to be within 3% error.
- Average operating pressure data validity increased from 3 to 5 due to a formula being developed using total customers in each zone and the median pressure within those zones to find a weighted average system pressure. All other previous criteria met.
- Replaced 9 miles of aging pipe with known elevated rates of leaks and breaks to mitigate real water losses.

Certification Statement by Utility Executive:

This water loss audit report meets the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34 and has been prepared in accordance with the method adopted by the American Water Works Association, as contained in their manual, *Water Audit and Loss Control Programs, Manual M36, Fourth Edition* and in the Free Water Audit Software version 5.

Executive Name (Print)

Executive Position

Signature

Date

Steve Johnson

Assistant General Manager

9/30/2019